AMENDMENTS TO THE SPECIFICATION

Please replace Paragraph [0039], [0051], [0055] and [0090] with the following paragraph rewritten in amendment format:

[0039] The technique of MII and its application to control multiphoton processes is based on rationally designing an electric field required to achieve an articular target with a minimum number of parameters. The method is based on calculating the amplitude of the *n*th-order electric field and comparing it to the absorption spectrum of the molecules being controlled. This provides a strong physical understanding of the control process, which can be very useful in the interpretation of experiments where the field is optimized by computer programs based on evolutionary learning [[s]] or similar methods.

[0051] The version of MIIPS illustrated in Figure 15 uses a thin SHG crystal 507, spectrometer 503, pulse shaper 129 and a femtosecond laser 123. A fs laser pulse is preferred but, for test data disclosed herein, 50 fs pulses from a regeneratively amplified Ti:Sapphire laser are employed wherein the pulse energy is attenuated down to ~ 5 μJ. For the test data herein, A 0.3 mm βBBO type I crystal is used for SHG 507 and the output is attenuated and directed to spectrometer 503 with a cooled CCD detector 511. System 121 further has a redirecting mirror 513, two quartz cylindrical lenses 515 (200 mm focal length, the upstream one for focusing and the downstream one for collimating). For the tests, a spatial light modulator was used for pulse shaper 129 consisting of two 128 LCD elements (which can be obtained from CRI Inc. as model number SLM-256). For the test, the pulse shaper is carefully calibrated to provide accurate phase delays (better than one degree) with no changes to polarization or

amplitude. The phase distortions used to obtain the data are generated at the pulse compressor after regenerative amplification. Referring now to Figures 13 and 14, self-ultrafast switching is based on pulse phase modulation in pulse shaper 505, a thin SHG crystal 507 causing multiphoton intrapulse interference, dispersive optics 523, and CCD camera detector 511. The simplicity and accuracy of this method make it practical for the evaluation of laser pulses close to transform limit and for the evaluation of phase distortion from optical elements.

[0055] Figure 6b is a flow chart showing an automated pulse chirp determination for arbitrary smooth phase distortions. This method is based on the use of a pulse shaper and obtaining a phase scan ~~PhaseScan~~, wherein the spectrum of the SHG is [[as]] a function of phase parameter δ for $\Phi(\omega)=\alpha Cos(\gamma\omega+\delta)$. This method is non-iterative and it directly obtains the desired values without evolutionary learning calculations. Therefore this method is very stable. This method does not depend on overlap between two pulses in space and time. Moreover, the pulse analyzes itself in a thin SHG crystal.

[0090] Two-photon microscopy provides significant possibilities for fluorescence imaging and photochemistry. It offers attractive advantages, including higher resolution, background-free signal, lower background scattering, better penetration in thick samples, and reduced photon-induced damage, which arise from the basic physical principle that the absorption depends on the square of the excitation intensity. Two-photon microscopy is amenable to multiple-probe staining, whereby two-photon transitions excite different probe molecules that emit at different wavelengths, and for functional imaging of living cells. See U.S. Patent No. 5,034,613 which issued to Denk,

on July 23, 1991; U.S. Patent No. 6,166,385 which issued to Webb, on December 26, 2000; U.S. Patent No. 6,344,653 which issued to Webb, on February 5, 2002; U.S. Patent No. 5,759,767 which issued to Lakowicz, on June 2, 1998; and W.R. Zipfel, et al., "Nonlinear magic: multiphoton microscopy in the biosciences," Nature Biotechnology, 121 (11): 1369-1377 (Nov. 2003); all the above patents are incorporated herein by reference. Phase-modulated femtosecond pulses can selectively excite one type of probe molecule only, leaving the others in their ground state. Multiphoton excitation is achieved by multiphoton intrapulse interference (MII) and this can be accomplished efficiently using binary phase shaping.[[.]] Selective excitation is used to enhance contrast and achieves functional imaging of samples stained with fluorescent probes sensitive to their microscopic chemical environment.